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the world that neglected him will care for him—after many days perhaps, but most assuredly.

FRANCIS C. RUSSELL.

CHICAGO.

ASSOCIATED PRIME NUMBER MAGIC SQUARES.

Associated magic squares are those in which any two numbers that are placed symmetrically equidistant from the center of the square are equal in summation to any other couplets so situated. When *n* is an even number these squares are necessarily constructed entirely of couplets, but when *n* is odd, the central cell contains the middle number of the series, and all other numbers are arranged in couplets.

ASSOCIATED MAGIC SQUARES IN WHICH *n* IS ODD.

As in the case of paneled magics it is necessary to find $4 + 8 + 12 \ldots\ldots + 2\ (n - 1)$ couplets, each couplet summing twice a certain prime number which must occupy the central cell.

Since all magic squares of the 3d order are associated and constructed from the same formula, the square shown in Fig. 1 and first made by Mr. Henry E. Dudeney (1900) has the lowest possible summation, S = 111.

67	1	43
13	37	61
31	73	7

Fig. 1.

491	263	23	419	59
149	191	461	53	401
71	269	251	233	431
101	449	41	311	353
443	83	479	239	11

Fig. 2.

1223	881	419	179	311	461	1013
1151	173	89	1259	191	443	1181
251	521	683	773	1277	263	719
929	233	1229	641	53	1049	353
563	1019	5	509	599	761	1031
101	839	1091	23	1193	1109	131
269	821	971	1103	863	401	59

Fig. 3.

For squares of the 5th order twelve couplets are needed and an associated magic square of this order is shown in Fig. 2, S = 1255.

Squares of the 7th order require twenty-four couplets, and Fig. 3 is an example, having a summation of 4487.

911	1571	1427	1373	857	1913	2141	1097	1013
863	2213	2267	1181	2441	23	653	2621	41
5	647	947	2633	1151	1907	317	2423	2273
1511	2381	71	1973	1301	2351	2477	191	47
1451	887	2243	401	1367	2333	491	1847	1283
2687	2543	257	383	1433	761	2663	353	1223
461	311	2417	827	1583	101	1787	2087	2729
2693	113	2081	2711	293	1553	467	521	1871
1721	1637	593	821	1877	1361	1307	1163	1823

Fig. 4.

Fig. 4 shows an associated magic square of the 9th order in which forty couplets are used, the summation being 12,303.

ASSOCIATED MAGIC SQUARES IN WHICH *n* IS EVEN.

These squares demand the use of $n^2/2$ couplets, but these couplets are not required to sum twice a given prime number as in squares where *n* is odd, which fact accounts for their lower summations in proportion to values of *n*.

It is capable of algebraic proof that an associated magic square of the fourth order must be constructed from a balanced series of numbers as shown in Fig. 5. The smallest series of prime numbers, filling this requirement, is given in Fig. 6, and Fig. 7 shows an associated magic square made therefrom with S = 240. It is believed that this square was first made by Mr. L. S. Frierson, December 25, 1911.

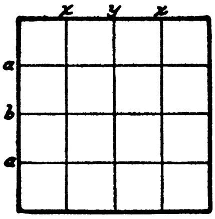
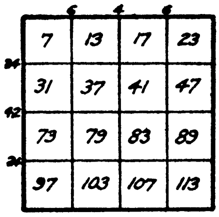


Fig. 5.



7	13	17	23
31	37	41	47
73	79	83	89
97	103	107	113

Fig. 6.

73	41	113	13
23	103	31	83
37	89	17	97
107	7	79	47

Fig. 7.

An associated square of the 6th order requires eighteen couplets, and an example of this square, S = 630, is given in Fig. 8.

197	71	83	79	37	163
17	97	109	29	179	199
167	151	53	137	103	19
191	107	73	157	59	43
11	31	181	101	113	193
47	173	131	127	139	13

Fig. 8.

271	1	227	353	421	503	163	101
491	439	151	337	113	311	61	137
269	383	47	197	233	11	443	457
131	23	479	281	401	79	179	467
43	331	431	109	229	31	487	379
53	67	499	277	313	463	127	241
373	449	199	397	173	359	71	19
409	347	7	89	157	283	509	239

Fig. 9.

For a square of the 8th order, thirty-two couplets must be used as shown in Fig. 9. S = 2040. For certain arithmetical reasons a pandiagonal magic square of the 10th order cannot be made from a series of consecutive numbers,[1] and for similar reasons, an associated square of this order cannot be made from a series of

953	607	113	349	919	317	181	337	827	347
127	257	751	421	727	659	947	907	23	131
167	757	571	929	137	971	103	7	761	547
397	109	359	179	739	389	719	977	373	709
557	307	541	911	491	677	839	107	53	467
523	937	883	151	313	499	79	449	683	433
281	617	13	271	601	251	811	631	881	593
443	229	983	887	19	853	61	419	233	823
859	967	83	43	331	263	569	239	733	863
643	163	653	809	673	71	641	877	383	37

Fig. 10.

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[1] See "Notes on the Construction of Magic Squares of Orders in which n is of the General Form $4p+2$," by W. S. Andrews and L. S. Frierson, *The Monist*, April 1912, Vol. XXII, No. 2, p. 304.

couplets, the summation of which, individually, is evenly divisible by 4. Fifty couplets are required for a square of this order, and fifty-one can be found summing 840, but for the above reasons they are inadmissible. Fifty other couplets can, however, be found which individually sum 990, which is not evenly divisible by 4 and can therefore be used. An associated magic square made therefrom is shown in Fig. 10.

The writer believes that all of the associated magic squares mentioned in this article show the lowest possible summation.

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CURRENT PERIODICALS.

In the *Revue de Métaphysique et de Morale* for March, 1914, L. Dugas gives the text and variants of, together with a commentary on, the fragment *La Feuille de charmille* of the philosopher and poet Jules Léquyer, of whom one of his friends, Le Gal La Salle, said: "He has left pages worthy of the greatest thinkers; he has not taken rank among them." An American mathematician, A. R. Schweitzer, studies the guiding ideas of genetic logic of mathematics. Viewing mathematics as a science of discovery, the author attempts a general description of its logical position, the establishment of parallels between certain mathematicians and certain philosophers—such as Grassmann and Herbart and Schleiermacher—and the examination of examples of mathematical "activity." To compare, as the author does, the definition of mathematics given by Bertrand Russell in his *Principles of Mathematics,* which is a description of the logical nature of mathematics itself, with the definition, given by C. S. Peirce, of mathematics as the discovery of certain relations, seems to overlook the clear distinction that has existed since Kant between logic and the theory of knowledge on the one hand, and psychology on the other. Take an analogy: it is the concern of chemistry to analyze a given chemical compound; not to decide how it was brought into the laboratory. Examples of the guiding ideas of mathematics are then illustrated and discussed. (1) The principle of comparison is, in the words of E. H. Moore, that "the existence of analogies between central features of various theories implies the existence of a general theory which underlies the particular theories and unifies them with respect to those central features." (2) The principle of continuation is